

IN THE CLAIMS:

Please cancel Claims 7, 16-18, 20, 21, 25-28, 33, 34 and 37, and add new Claims 39-76 as follows:

Please amend Claim 35 as follows:

35. (Once Amended) An organism selected from transgenic plants, parts of plants, protoplasts, plant tissues and plant propagation materials, wherein the organism comprises an intracellular concentration of a polypeptide according to Claim 15 which is increased or reduced in comparison with the corresponding wild-type cells after introducing a nucleic acid which encodes a polypeptide comprising the amino acid sequence of SEQ ID NO: 6.

[Please add the following claims:]

39. (New) A nucleic acid which encodes a polypeptide from tobacco with the bioactivity of a phytoene synthase, comprising the amino acid sequence of SEQ ID NO: 2.

40. (New) A nucleic acid according to Claim 39, wherein the nucleic acid encodes a polypeptide with the amino acid sequence of SEQ ID NO: 2.

41. (New) A nucleic acid according to Claim 39, wherein the nucleic acid is a single-stranded or double-stranded DNA or RNA.

42. (New) A nucleic acid according to Claim 41, wherein the nucleic acid is a fragment of genomic DNA or cDNA.

43. (New) A nucleic acid according to Claim 39, wherein the nucleic acid is derived from tobacco plants.

44. (New) A nucleic acid according to Claim 39, comprising a sequence selected from

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- (a) the sequence of SEQ ID NO: 1,
 - (b) sequences encoding a polypeptide which comprises the amino acid sequence of SEQ ID NO: 2,
 - (c) partial sequences of the sequences defined under (a) or (b) which are at least 14 base pairs in length,
 - (d) sequences which hybridize with the sequences defined under (a), (b) or (c),
 - (e) sequences which are complementary to the sequences defined under (a), (b) or (c), and
 - (f) sequences which, owing to the degeneracy of the genetic code, encode the same amino acid sequence as the sequences defined under (a) to (c).

45. (New) A DNA construct comprising a nucleic acid according to Claim 39 and a heterologous promoter.

46. (New) A vector comprising a nucleic acid according to Claim 39.

47. (New) A vector according to Claim 46, wherein the nucleic acid is linked functionally to regulatory sequences which ensure the expression of the nucleic acid in pro- or eukaryotic cells.

48. (New) A host cell containing a nucleic acid according to Claim 39.

49. (New) A host cell according to Claim 48, wherein the host cell is a prokaryotic cell.

50. (New) A host cell according to Claim 48, wherein the host cell is an eukaryotic cell.

51. (New) A process for generating a polypeptide with the bioactivity of a phytoene synthase which is encoded by a nucleic acid of SEQ ID NO: 1 including an amino acid sequence of SEQ ID NO 2, comprising

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- (a1) culturing a host cell comprising a nucleic acid which encodes a polypeptide comprising the amino acid sequence of SEQ ID NO: 2 under conditions which ensure the expression of the nucleic acid, or
 - (a2) expressing a nucleic acid which encodes a polypeptide comprising the amino acid sequence of SEQ ID NO: 2 in an *in-vitro* system, and
 - (b) obtaining the polypeptide from the cell, the culture medium or the *in-vitro* system.

52. (New) A vector comprising a DNA construct according to Claim 45.

53. (New) A host cell containing a DNA construct according to Claim 45.

54. (New) A host cell containing a vector according to Claim 46.

55. (New) A process for generating a polypeptide with the bioactivity of a phytoene synthase which is encoded by a nucleic acid of SEQ ID NO: 1 including an amino acid sequence of SEQ ID NO: 2, comprising

- (a1) culturing a host cell comprising a nucleic acid comprising a sequence selected from
 - (i) the sequence of SEQ ID NO: 1,
 - (ii) sequences encoding a polypeptide which comprises the amino acid sequence of SEQ ID NO: 2,
 - (iii) sequences which hybridize with the sequences defined under (i) or (ii),
 - (iv) sequences which are complementary to the sequences defined under (i) or (ii), and
 - (v) sequences which, owing to the degeneracy of the genetic code, encode

the same amino acid sequence as the sequences defined under (i) or (ii);

in a culture medium under conditions which ensure the expression of the nucleic acid, or

(a2) expressing a nucleic acid which encodes a polypeptide with the bioactivity of a phytoene saturase, comprising the amino acid sequence of SEQ ID NO: 2 in an *in-vitro* system, and

32 cont. (b) obtaining the polypeptide from the cell, the culture medium or the *in-vitro* system.

56. (New) An organism selected from plants, parts of plants, protoplasts, plant tissues or plant propagation materials, wherein the organism comprises a polypeptide with the bioactivity of a phytoene synthase which is encoded by a nucleic acid of SEQ ID NO: 1 including an amino acid sequence of SEQ ID NO: 2 whose bioactivity or expression pattern is modified in comparison with the corresponding endogenous polypeptides.

57. (New) A nucleic acid comprising a sequence selected from the group consisting of:

(a) the sequence of SEQ ID NO: 1,

(b) sequences encoding polypeptides which comprises the amino acid sequence of SEQ ID NO: 2, and

(c) sequences which, owing to the degeneracy of the genetic code, encode the same amino acid sequence as the amino acid sequence of SEQ ID NO: 2.

58. (New) A nucleic acid which encodes a polypeptide from tobacco with the bioactivity of a phytoene synthase, comprising the amino acid sequence of SEQ ID NO: 4.

59. (New) A nucleic acid according to Claim 58, wherein the nucleic acid encodes a polypeptide with the amino acid sequence of SEQ ID NO: 4.

60. (New) A nucleic acid according to Claim 58, wherein the nucleic acid is a single-stranded or double-stranded DNA or RNA.

61. (New) A nucleic acid according to Claim 60, wherein the nucleic acid is a fragment of genomic DNA or cDNA.

62. (New) A nucleic acid according to Claim 58, wherein the nucleic acid is derived from tobacco plants.

63. (New) A nucleic acid according to Claim 58, comprising a sequence selected from

- (a) the sequence of SEQ ID NO: 3,
- (b) sequences encoding a polypeptide which comprises the amino acid sequence of SEQ ID NO: 4,
- (c) partial sequences of the sequences defined under (a) or (b) which are at least 14 base pairs in length,
- (d) sequences which hybridize with the sequences defined under (a), (b) or (c),
- (e) sequences which are complementary to the sequences defined under (a), (b) or (c), and
- (f) sequences which, owing to the degeneracy of the genetic code, encode the same amino acid sequence as the sequences defined under (a) to (c).

64. (New) A DNA construct comprising a nucleic acid according to Claim 58 and a heterologous promoter.

65. (New) A vector comprising a nucleic acid according to Claim 58.

66. (New) A vector according to Claim 65, wherein the nucleic acid is linked functionally to regulatory sequences which ensure the expression of the nucleic acid in pro- or eukaryotic cells.

67. (New) A host cell containing a nucleic acid according to Claim 58.

68. (New) A host cell according to Claim 67, wherein the host cell is a prokaryotic cell.

69. (New) A host cell according to Claim 67, wherein the host cell is an eukaryotic cell.

70. (New) A process for generating a polypeptide with the bioactivity of a phytoene synthase which is encoded by a nucleic acid of SEQ ID NO: 3 including an amino acid sequence of SEQ ID NO 4, comprising

- (a1) culturing a host cell comprising a nucleic acid which encodes a polypeptide comprising the amino acid sequence of SEQ ID NO: 4 under conditions which ensure the expression of the nucleic acid, or
- (a2) expressing a nucleic acid which encodes a polypeptide comprising the amino acid sequence of SEQ ID NO: 4 in an *in-vitro* system, and
- (b) obtaining the polypeptide from the cell, the culture medium or the *in-vitro* system.

71. (New) A vector comprising a DNA construct according to Claim 64.

72. (New) A host cell containing a DNA construct according to Claim 64.

73. (New) A host cell containing a vector according to Claim 65.

74. (New) A process for generating a polypeptide with the bioactivity of a phytoene synthase which is encoded by a nucleic acid of SEQ ID NO: 3 including an amino acid sequence of SEQ ID NO: 4, comprising

(a1) culturing a host cell comprising a nucleic acid comprising a sequence selected from

- (i) the sequence of SEQ ID NO: 3,
- (ii) sequences encoding a polypeptide which comprises the amino acid sequence of SEQ ID NO: 4,
- (iii) sequences which hybridize with the sequences defined under (i) or (ii),
- (iv) sequences which are complementary to the sequences defined under (i) or (ii); and
- (v) sequences which, owing to the degeneracy of the genetic code, encode the same amino acid sequence as the sequences defined under (i) or (ii);

in a culture medium under conditions which ensure the expression of the nucleic acid, or

(a2) expressing a nucleic acid which encodes a polypeptide with the bioactivity of a phytoene saturase, comprising the amino acid sequence of SEQ ID NO: 4 in an *in-vitro* system, and

(b) obtaining the polypeptide from the cell, the culture medium or the *in-vitro* system.

75. (New) An organism selected from plants, parts of plants, protoplasts, plant tissues or plant propagation materials, wherein the organism comprises a polypeptide with the bioactivity of a phytoene synthase which is encoded by a nucleic

acid of SEQ ID NO: 3 including an amino acid sequence of SEQ ID NO: 4 whose bioactivity or expression pattern is modified in comparison with the corresponding endogenous polypeptides.

76. (New) A nucleic acid comprising a sequence selected from the group consisting of:

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- (a) the sequence of SEQ ID NO: 3,
 - (b) sequences encoding polypeptides which comprises the amino acid sequence of SEQ ID NO: 4, and
 - (c) sequences which, owing to the degeneracy of the genetic code, encode the same amino acid sequence as the amino acid sequence of SEQ ID NO: 4.
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